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ABSTRACT

This publication contains a brief description of the MARC communications format, a summary of how machine-readable records are created, information about the MARC Distribution Service, and a selected bibliography of publications concerning MARC, written by either Library of Congress staff members or others. In addition, a report on automation in technical processing at the Library, which summarizes the principal activities of the MARC Development Office is included. It is hoped that this publication provides a general background for the reader, who can then seek more detailed information from the professional literature or other sources. (Author)

information on the MARC system

Prepared by the MARC Development Office

Second Edition

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Washington
1972

PREFACE

This publication contains a brief description of the MARC communications format, a summary of how machine-readable records are created, information about the MARC Distribution Service, and a selected bibliography of publications concerning MARC, written by either Library of Congress staff members or others. In addition, we have included a report on automation in technical processing at the Library, which summarizes the principal activities of the MARC Development Office. It is hoped that this publication provides a general background for the reader, who can then seek more detailed information from the professional literature or other sources.

Henriette D. Avram
Chief, MARC Development Office
Processing Department

February 1972

CONTENTS

MARC FORMAT

The MARC format is a standard communications format in which the Library of Congress distributes its cataloging data in machine-readable form. Standardization already exists on catalog records to the extent that the Anglo-American Cataloging Rules are followed in creating the cataloging information. In machine records, standardization is carried beyond the content of the record (the cataloging information) to the structure and the identifying elements or content designators.

The structure of a MARC record can be compared to an empty container; it provides a basic framework to which are added the content designators and the contents. Content designators and contents of a record may vary depending upon the type of material being cataloged, but the structure of the record is identical for all forms of material.

A MARC record distributed by the Library of Congress contains all the information generally found on a printed card. In addition, certain kinds of information considered useful for rapid retrieval have been included in coded form. For example, the language of the work is represented by a three-character alphabetic code, e.g., "eng" for English, "fre" for French, etc. It should be noted that since all data elements are identified by content designators, they can also be retrieved; however, inclusion of data elements in coded form in a fixed location in the machine record facilitates the retrieval process. This fixed field information, together with the variable fields (cataloging data elements which may vary in length), provide the flexibility required for the many uses of MARC records.

The MARC formats developed at the Library of Congress are implementations of the American National Standard for Bibliographic Information Interchange on Magnetic Tape (ANSI Z39.2-1971). MARC formats for books, serials, maps, and films have been published, and formats for manuscripts, music, and sound recordings are being developed. Although the Library does not have any immediate plans for implementing a project to distribute machine-readable records for all of these materials, it is hoped that publication of these formats will aid other institutions in their automation projects by providing specifications for data elements.

MARC INPUT DOCUMENTS AND COMPUTER-PRODUCED PRINTED PRODUCTS

The following nine illustrations are examples of the input forms and computer-produced displays that are used by the MARC editing staff to create bibliographic records in machine-readable form.

Figure 1 is an example of a MARC input worksheet. It contains all cataloging data recorded by the catalogers, plus the tags, delimiters, subfield codes, and fixed field codes transcribed by the MARC editors. Upon completion of the cataloging and initial editing processes, the input worksheet is sent to the MARC Typing Unit, where the data are transcribed and converted to machine-readable form on magnetic tape.

Figure 2 is an example of the MT/ST (Magnetic Tape/Selectric Typewriter) hard copy that is produced in addition to the tape cassette containing converted MARC records. The tape cassettes are sent to the Library's Computer Service Center for processing through the MARC system programs.

Figure 3 is an example of the computer-produced MARC proofsheet which displays the data after they have been processed by the MARC system programs. The proofsheet is matched with its corresponding input worksheet and sent to the MARC editor for proofreading. The corrected proofsheets are then returned to the MARC Typing Unit for corrections to be transcribed and converted. This process produces an MT/ST hard copy of the corrections and a tape cassette containing these corrections (see Figure 4). This tape is sent to the Computer Service Center for processing, and another proofsheet is produced which displays the corrected MARC record (see Figure 5).

The proofsheet is proofread again, and if any additional corrections are noted, it is sent through another correction cycle. If the record is free of errors, it is verified and added to the master data base.

Figure 6 illustrates three different forms of the same MARC record. Figure 6a displays a full MARC record in the communications format (including Leader and Record Directory) with the characters making up the record and their ASCII hexadecimal values. The characters of the record are the first line of each three-line row. The hexadecimal coded values of the characters are the

second and third lines of each row of three. Some of the characters, e.g., delimiters, are represented by hex values only. 6b displays the traditional catalog card format of the same record. Figure 6c is a graphic representation of the same record as it is recorded on magnetic tape in the communications format. It is the same as 6a but does not show the hex values. Figure 7 is an example of a computer-produced listing of MARC records arranged by author, and Figure 8 is an example of a computer-produced listing of MARC records arranged by subject.

JBT

FEB 24 1970

Languages LAN ☐ ENG		
FFD	Conf/Meeting 2.	Festschrift 3.
Index 4.	M E in body 5. X	Publisher is M E 6.
Juvenile 10.	Fiction 11.	Biography 12.
Subject is M E 13.		Pub Date Key 20. S
Date 1 21. 1969		Date 2 22.
Country of Pub 23. XX		Repro Form 25.
Contents Forms 26.		Bib Level 27.
Modified Record 28.		Cataloging Source 29.
GAC		

CAL HD 9560 .5 .S8

MEP Sugarman, Stephen.

TI ‡c Petroleum industry handbook. ‡ Edited by Stephen Sugarman. n.p.

IMP Published by J. M. Weiner for D. H. Blair ‡ 1969,

COL xxii, 794 p. ‡ illus, maps. ‡ 29 cm.

NOG "For limited distribution only".

✓ co 15de69 agam DO NOT SET

SUT ‡x 1. Petroleum industry and trade — Handbooks, manuals, etc.

I. Title.

DDC 338.2/7/282

Library of Congress 70 2

75-10118

MARC

B

Figure 1. MARC II Input Worksheets Used by MARC Editorial Office

crd	75-10118
lan	eng
ffd	5.x 20.s 21.1969 23.xx
cal	HD958 60.5#.S8
mep	Sugarman, Stephen.
til#c	Petroleum industry handbook.#[Edited by Stephen Sugarman.
imp	n.p.]#Published by J. M. Weiner for D. H. Blair#[1969]
col	xxii, 794 p.#illus., , maps.#29 cm.
nog	"For limited distribution only".
sut#x	Petrolu eum industry and trade--Handbooks, manuals, etc.
ddc	338.1/7/282

Figure 2. MT/ST Hard Copy

001 (c	~~CRD~~	75-10118
050/1	CAL ‡ab	‡HD9560.5‡.S8
100/1	MEPS ‡a	‡Sugarman, Stephen.
245/1	TILA‡ac	‡Petroleum industry handbook.‡[Edited by Stephen Sugarman.
260/1	IMP ‡abc	‡n.p.]‡Published by J. M. Weiner for D. H. Blair‡[1969]
300/1	COL‡abc	‡xxii, 794 p.‡illus, maps.‡29 cm.
500/1 (c	~~NOG‡a~~	‡‡"For limited distribution only".
650/1	SUT-L‡ax	‡Petroleum industry and trade‡Handbooks, manuals, etc.
082/1 Cc	~~DDC‡a~~	‡‡338.(2)/1/282
008	FPD	

1. 2. 3. 4. 5.x 6.
10. 11. 12. 13. 14. 15.eng
20.s 21.1969 22. 23.xx 24.ab 25.
26. 27.m 28. 29.

Figure 3. MARC Proofsheet

ØØ1(V 77-1Ø1Ø5

ØØ1(V 75-6Ø268Ø

10

ØØ1(C 75-1Ø118
500/1(C ##"For limited distribution only."
Ø82/1(C ##338.2/7/282

Figure 4. MT/ST Hard Copy, Verification and Corrections

001	CRD(C	75-10118	1
500/1	NOG‡(C	‡"For limited distribution only."	
082/1	DDC‡(C	‡338.2/7/282	

***** CORRECTED RECORD FOLLOWS. 14

001	CRD	75-10118	3
050/1	CAL ‡ab	‡HD9560.5‡.S8	
100/1	MEPS ‡a	‡Sugarman, Stephen.	
245/1	TILA‡ac	‡Petroleum industry handbook.‡[Edited by Stephen Sugarman.	
260/1	IMP ‡abc	‡n. p.]‡Published by J. M. Weiner for D. H. Blair‡[1969]	
300/1	COL‡abc	‡xxii, 794 p.‡illus, maps.‡29 cm.	
500/1	NOG‡a	‡"For limited distribution only."	
650/1	SUT-L‡ax	‡Petroleum industry and trade‡Handbooks, manuals, etc.	
082/1	DDC‡a	‡338.2/7/282	
008	FFD	1. 2. 3. 4. 5.x 6.	
		10. 11. 12. 13. 14. 15.eng	
		20.s 21.1969 22. 23.xx 24.ab 25.	
		26. 27.m 28. 29.	

-8-11

Figure 5. MARC Proofsheet, Correction Record

```
   SIZE  BLK  REC     ....5...10...15...20...25...30...35...40...45...50...55...60...65...70...75...80...85...90...95..100
    515   1    1      00515nam  2200145       0010013000000008004100013050001800054082001600072100002300088245006300111260 0
                      33333666223333333222222223333333333333333333333333333333333333333333333333333333333333333333333333333
                      00515E1D002200145000000000100130000000080041000130500018000540820016000721000023000882450063001112600

                      06100174300003900235500003700274650005900311     75010118   700319s1969     xx ab              00010 eng    0
                      33333333333333333333333333333333333333333333331222333333332133333373333222277266222222222333332666221 3
                      06100174300003900235500003700274650005900311E000750101190E700319219690000088012000000000000100 E700E0

                       aHD9560.5 b.S8     a338.2/7/282 10 aSugarman, Stephen. 1 aPetroleum industry handbook. c[Edited by
                      216443333231625312216333232323331331657667666225767666213216567766676266677777266666662165466766247
                      0F1849560E5F2E38E00F1338E2F7F282E10F135712D1EC0345085EEE10F10542FC55D09E45342901E42FFDEF3B549454029

                       Stephen Sugarman. 0 an.p.] bPublished by J. M. Weiner for D. H. Blair c[1969]    axxii, 794 p. bil
                      25767766257667665213216627251657666766626724224225666672667242242246667165333351221677662233327216666
                      0345085E035712D1EEE00F1EE0EDF2052C938540290AE0DE0759E5206F204E08E02C192F3B1969DED0F18899C079400EF29C

                      lus. maps. c29 cm.     a"For limited distribution only." 0 aPetroleum industry and trade xHandbooks,
                      67722667721633266212216246726666766266777667766626667221231656776667662666777726662776661746666666672
                      C53C0D103EF32903DEE00F126F20C9D9454049342925491FE0FEC9E2E00F10542FC55D09E45342901E4042145F981E42FF33C

                       manuals, etc.*
                      266676672267621
                      0D1E51C3C0543ED
```

Figure 6a. MARC Record in the Communications Format

Sugarman, Stephen.

Petroleum industry handbook. [Edited by Stephen Sugarman. n. p.] Published by J. M. Weiner for D. H. Blair [1969]

xxii, 794 p. illus., maps. 29 cm.

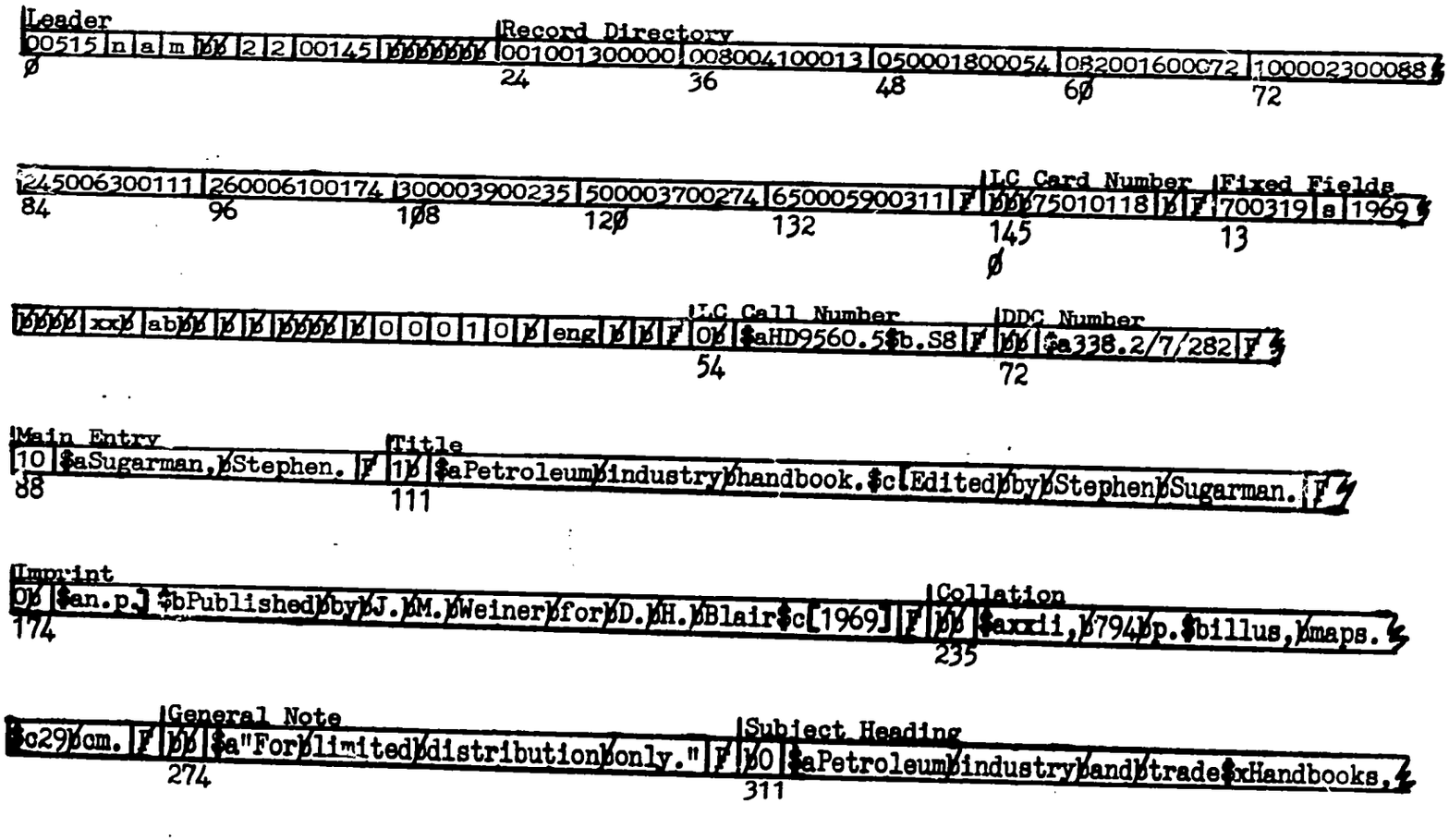
"For limited distribution only."

1. Petroleum industry and trade — Handbooks, manuals, etc. I. Title.

HD9560.5.S8 338.2'7'282 75-10118
MARC

Library of Congress 70 [2]

Figure 6b. LC Printed Card



ß = blank F = field terminator R = record terminator

Figure 6c. MARC Record in the Communications Format

Organization for Economic Cooperation and Development. Social Affairs Division.
Measures of adjustment of rural manpower to industrial work and urban areas. Paris, Organisation for Economic Co-operation and Development, 1968. 117 p. 24 cm. Labour mobility, 8 $2.00 F***

1. Labor mobility. 2. Manpower policy. 3. Rural-urban migration. (Series: Organization for Economic Cooperation and Development. Social Affairs Division. Labour mobility, 8

HD5706 .O68 331.1/27 74-448285

Plomer, Henry Robert, 1856-1928.
A dictionary of the booksellers and printers who were at work in England, Scotland and Ireland from 1641 to 1667, by Henry R. Plomer. London, Bibliographical Society, 1968. xxiv, 199 p. 22 cm. 60/-
B69-22869

First published in 1907.

1. Printers Gt. Brit. 2. Booksellers and bookselling Gt. Brit. I. Biblicgraphical Society, London.

Z151 .D52 1968 655.1/42 70-446839
197217826

Spring, Marion Ursula Howard.
Frontispiece: a childhood portrait by Marion Howard Spring; with a foreword by Derek Tangye. London, Collins, 1969. 127 p. 21 cm. 18/-
B69-23741

CT788.S6875 A3 914.2/03/820924 70-446977
002112728

Sugarman, Stephen.
Petroleum industry handbook. Edited by Stephen Sugarman.
.p. Published by J. M. Weiner for D. H. Blair 1969 xxii, 794 p. illus, maps. 29 cm.
"For limited distribution only."

1. Petroleum industry and trade Handbooks, manuals, etc.

HD9560.5 .S8 338.2/7/282 75-10118

Figure 7. MARC Records, Arranged by Author

LANGUAGE LABORATORIES--ADDRESSES, ESSAYS, LECTURES.

Bung, Klaus.
Programmed learning and the language laboratory: collected papers; edited by Klaus Bung. London, Longmac, 1967-68 v. 1, 1968 2 v. illus. 25 cm. 45/- (v. 1) 35/- (v. 2) B69-00473 (v. 1) B67-25873 (v. 2)
Includes bibliographies.

1. Language and languages Programmed instruction Addresses, essays, lectures. 2. Language laboratories Addresses, essays, lectures.
PB36 .B8 407.7 74-447769

MANPOWER POLICY.

Organization for Economic Cooperation and Development. Social Affairs Division.
Measures of adjustment of rural manpower to industrial work and urban areas. Paris, Organisation for Economic Co-operation and Development, 1968. 117 p. 24 cm. Labour mobility, 8 $2.00 P***

1. Labor mobility. 2. Manpower policy. 3. Rural-urban migration. (Series: Organization for Economic Cooperation and Development. Social Affairs Division. Labour mobility, 8
HD5706 .O68 331.1/27 74-448285

MONEY.

Harrod, Roy Forbes, Sir, 1900-
Money by Roy Harrod. London, Macmillan; New York, St. Martin's P., 1969. xi, 355 p. 23 cm. 65/- B69-26181

1. Money.
HG221 .H314 1969 332.4 72-85481
333105060

PETROLEUM INDUSTRY AND TRADE--HANDBOOKS, MANUALS, ETC.

Sugarman, Stephen.
Petroleum industry handbook. Edited by Stephen Sugarman. .p. Published by J. M. Weiner for D. H. Blair 1969 xxii, 794 p. illus, maps. 29 cm.
"For limited distribution only."

1. Petroleum industry and trade Handbooks, manuals, etc.
HD9560.5 .S8 338.2/7/282 75-10318

Figure 8. MARC Records, Arranged by Subject

MARC DISTRIBUTION SERVICE

The MARC Distribution Service provides, on a weekly basis, magnetic tapes containing bibliographic records in the MARC communications format for all English language monographs currently cataloged at the Library of Congress. These records also include the titles in English acquired through the National Program for Acquisitions and Cataloging and, since October 1971, the records processed under the Cataloging in Publication program. There are approximately 1,200 to 1,500 titles on each tape.

MARC tapes are available in both 7-track, 556 cpi, and 9-track, 800 cpi, mini-reels. They are written in the American Standard Code for Information Interchange (ASCII), which has been adopted by the American National Standards Institute for the interchange of information on magnetic tape; however, the ASCII standard 7-bit code has been expanded to an 8-bit code (for 9-track tapes) and contracted to a 6-bit code (for 7-track tapes). Complete specifications for the character set, as well as descriptions of the tape and record formats and the data fields, are found in the manual Books: A MARC Format (5th ed., 1972). This manual is provided without charge to new subscribers, and non-subscribers may purchase it from the Superintendent of Documents.

It should be noted that before the bibliographic data on the MARC tapes can be processed, they must be translated from the ASCII code to the computer code of the user's machine, e.g., IBM S/360 users would translate from ASCII to EBCDIC and IBM 1401 users would translate to BCD. A MARC tape can be printed without translation on an IBM 1403 model 2 or N-1 printer having the universal character set features. A 240-character read/write storage unit in the IBM 2020 Processing Unit is used to hold assigned print codes. The contents in storage can be changed by punching the new codes on punched cards and loading these into main storage. The new codes are then transferred to the storage unit. By this method, the ASCII code equivalents can be loaded in the storage unit, and the ASCII encoded MARC tapes can be printed intelligibly. Before attempting this, subscribers should consult the IBM 1403 printer component description manual.

The subscription price for the service is $1000 a year and covers the period from April 1 through March 31. Tapes are mailed from the Library of Congress each Wednesday. Subscriptions beginning later in the year will start on a quarterly boundary and expire on March 31. A cumulative tape containing records issued from the beginning of the current subscription year to the quarterly boundary will also be supplied. New subscribers will then receive weekly tapes for the remainder of the subscription year. Annual cumulations from the subscription year beginning on March 25, 1969, are available at $1000 for each cumulation.

Subscribers are requested to specify the kind of tape desired (7-track or 9-track). To ensure that they receive all communications such as addenda to the MARC format or technical notices about the tapes, subscribers are requested to submit the names, addresses, and phone numbers of people on the library and/or technical staff to whom these notices should be addressed. These people should be directly involved in the use of the MARC tapes.

Subscribers who have established regular accounts with the Card Division may charge their subscriptions to their accounts. Others should pay in advance by check or money order, made payable to Chief, Card Division, and sent to:

Card Division
Library of Congress
Building 159, Navy Yard Annex
Washington, D.C. 20541

Attention: MARC Distribution Service

Questions concerning subscriptions, prices, changes in mailing address, mailing or nonreceipt of tapes, and other related matters should also be sent to the above address. If a subscriber receives a tape that appears to be defective, the tape should be returned to the above address. If the Card Division can process the tape, the problem probably lies in the subscriber's system rather than in a defective tape. The tape will be returned to the subscriber, and a fee of $6.75 will be charged for this service. If the Card Division cannot process the tape, a new tape will be

generated and forwarded to the subscriber without charge. Defective tapes must be returned to the Library within six weeks after their receipt by the subscriber.

Requests from subscribers for technical assistance in the use of the MARC tapes should be addressed to:

Library of Congress
MARC Development Office
Washington, D.C. 20540

Attention: Senior Information Systems
Research Analyst

MARC TEST TAPE

Potential users of the MARC format may obtain a test tape for experimental purposes. This tape contains more than 200 records and is available as either a 7-track (556 cpi) or a 9-track (800 cpi) mini-reel. Books: A MARC Format, a manual describing the tape and record formats, the character set, and the data fields, will be sent with each tape.

The kind of tape desired should be specified in the order. The cost of the test tape is $20, payable in advance. Orders cannot be charged to Card Division deposit accounts. Checks or money orders should be made payable to Chief, Card Division, and sent to:

Card Division
Library of Congress
Building 159, Navy Yard Annex
Washington, D.C. 20541

Attention: MARC Distribution Service

AUTOMATION IN TECHNICAL PROCESSING AT THE LIBRARY OF CONGRESS

(Based on an article by Henriette D. Avram appearing in the 1972 volume of the Bowker Annual)

The MARC Development Office was established in the Processing Department of the Library of Congress in June 1970. The rationale leading to the creation of the office was to provide the climate in which to concentrate on automation in technical processing. The MARC Development Office is responsible for the development and implementation of systems to record cataloging data in machine-readable form; for the use of these records to produce book catalogs, special listings, and other printed output; and for the application of these records to internal bibliographical control.

Many of the office's activities are closely related to those of the MARC Editorial Office, the Technical Processes Research Office, and the Card Division, and some of the projects described in the following pages are the results of the combined efforts of these units and the MARC Development Office. The major activities in automation of technical processing at the Library are summarized below.

MARC

The MARC Distribution Service, which was established in March 1969, provides machine-readable records for all English language material cataloged by the Library of Congress after 1968 and, since October 1971, all records produced by the Cataloging in Publication program. At present, the data base contains approximately 200,000 records. It is planned to expand this coverage to motion pictures and filmstrips in fiscal 1972 and, if funds are available, to French language material in fiscal 1973. Although the production of MARC records is the responsibility of the MARC Editorial Office and the duplication and distribution of tapes the responsibility of the Card Division, the MARC Development Office maintains the MARC computer programs and is the liaison with both the national and international library community on bibliographic and technical matters related to records in machine-readable form.

There are currently 62 subscribers to the service. Through the services offered by several regional organizations such as the Ohio College Library Center and the Oklahoma Department of Libraries, the MARC data base is actually utilized by approximately 200 institutions. At the Library of Congress, MARC records are used to produce printed cards as part of the Card Division Mechanization Project. A retrieval program is also used to obtain products, either listings or cards, from the MARC data base. Various divisions in the Library are receiving one or more of the following products on a regular basis: records representing conference proceedings or other conference publications; all translations into English published in the United States; records for titles in certain subject areas such as science and technology; and titles with a particular geographic orientation, e.g., all books on China, regardless of subject (Roads--China; Art, Chinese, etc.)

In its efforts to promote standardization, the MARC Development Office, in cooperation with other units of the Library and with the advice of pertinent authorities outside the Library, continues to develop formats for other forms of material. Formats have been published for books, serials, films, and maps, and formats for manuscripts, music, and sound recordings are being developed.

The American National Standards Institute format structure for bibliographic information interchange on magnetic tape, which is based on MARC, has been recommended to the International Standards Organization for adoption.

RECON

The RECON Pilot Project came into existence as a result of a study conducted by a task force which was organized to investigate the problems of centralized conversion of retrospective catalog records and their distribution from a central source. The task force recommended the implementation of a pilot project at the Library of Congress to test empirically the techniques suggested in the feasibility study. Funds were received from the Council on Library Resources and the U.S. Office of Education in 1969 for the pilot project and for continuation of the activities of the task force.

The pilot project covered five major areas:

1) Techniques postulated in the RECON feasibility report were tested in an operational environment

by converting English language monographs cataloged in 1968 and 1969 but not included in the MARC Distribution Service.

2) Format recognition procedures and computer programs were developed and implemented.

3) Conversion techniques for processing older English language material and titles in foreign languages using the roman alphabet were analyzed.

4) A study of input devices that might facilitate the conversion of a large data base was conducted. Keying devices were tested in the MARC Editorial Office, and direct-read optical character readers were tested at the vendor's site. This phase of the work also included an investigation of cathode ray tube terminals and the use of a mini-computer for on-line input functions.

5) Microfilming techniques and their associated costs were investigated to determine the feasibility of providing source documents for a large-scale conversion project.

Activities of the RECON Working Task Force have included the following:

1) The feasibility of determining levels or subsets of the established MARC format that would allow a library using a lower level to be part of a future national network was investigated.

2) Problems associated with the production of a national union catalog consisting of Library of Congress entries and titles from other libraries (records in both machine-readable form and printed form) are being studied, and the estimated costs are being determined. This task postulates the use of a bibliographic register (full bibliographic entries arranged by sequential numbers) with indexes to the register by name, title, and subject and a register of locations.

3) An investigation is being conducted to determine the possibility and the cost of using

machine-readable data bases from a variety of institutions in a national bibliographic store to reduce the cost and to accelerate the conversion effort at the national level. The aim of this task is to establish whether it is more efficient to add records from selected data bases to the MARC data base or to reinput these records at the Library of Congress. The requirements for consistency in both cataloging data and content designators is being taken into account.

4) Alternative schemes to convert retrospective records are being studied with a view toward increasing the timeliness of these records. Conversion in reverse chronological order by category of material and language, as recommended in the RECON feasibility report, may not be the most satisfactory method for all purposes.

Progress reports on the pilot project and on the research conducted by the RECON Working Task Force have appeared in the Journal of Library Automation. The final report on the pilot project, describing the results of work done by both the Library of Congress and the RECON Working Task Force, is in preparation and should be available early in 1972.

Format Recognition

The MARC format uses tags, indicators, and subfield codes ("content designators") to identify cataloging data explicitly for computer manipulation. In addition, certain codes (or fixed field indicators) are assigned to designate the language of the text, country of publication, etc., or to indicate a particular condition such as the existence of an index or a bibliography. Preparation of data for conversion to machine-readable form (editing) involves assignment of content designators and fixed field codes by an editor. Since this editing process is tedious, time-consuming, and costly, it appeared advantageous to develop a method whereby the computer could examine character strings for certain keywords, significant punctuation, and other clues in order to assign content designators and fixed fields. This technique became known as format recognition.

The Library initiated a feasibility study on format recognition in the winter of 1968. Based on the encouraging results of the study, which was completed in February 1969, a decision was made to proceed with the development of a technique for machine editing of bibliographic records as part of the RECON Pilot Project. Through a series of program modules, each variable field is fully identified by assigning tags, indicators, and subfield codes and is then scanned for information needed for the fixed fields. For example, if the place subfield in the imprint statement has "London," a table of place names is checked for a match and "enk" is placed in the country code position; or if the subject heading contains the subdivision "Juvenile literature," the intellectual level indicator is set to "j" for juvenile works.

Approximately 17,000 RECON records have been processed by the format recognition programs since actual production began in May 1971. RECON records were used to test format recognition because they were not needed for a weekly production operation. The Library began to use format recognition on current MARC records in January 1972. The machine processing time for format recognition is approximately 3/4 second per record as compared to 3 seconds per record for fully edited records. Production rates of the editors, who now only proofread the machine-readable data, have increased significantly.

Since the MARC Distribution Service will be expanded to include records in other roman alphabet languages, the Library is analyzing the requirements to expand the format recognition algorithms to handle these languages. The complete logical design for format recognition, including typing specifications, has been published by the American Library Association under the title Format Recognition Process for MARC Records: A Logical Design.

Plan for the Systematic Automation of Technical Processing

To ensure that automation of technical processing proceeds in accordance with the priorities and requirements of the Processing Department and other departments in the Library, guidelines are being developed on the basis of the following criteria: 1) automation of a function must be technically feasible within the present state of the art; 2) the function must be capable of being automated in a reasonable period of time; and 3) the function must

be of such scope that it has a significant impact on the operations of the Library of Congress.

The guidelines may be augmented and/or modified in light of any of the following conditions: R&D activities dictate a different solution; new hardware devices allow for greater flexibility; funding situations change, resulting in a reduction or expansion of the plans; or experience in an operational mode, serving as a learning mechanism, suggests another approach. The importance of the guidelines, in addition to providing a blueprint for allocation of staff, training, and funds, is the ability to proceed in as orderly a way as possible with some guarantee that modules of the system will fit together as the system expands.

The guidelines constitute the master plan or the core bibliographic system toward which all efforts are directed. Some of the projects described below, such as the Multiple Use MARC System, the Order Division project, the Process Information File, and the Authority Files, are being developed in accordance with the guidelines.

Multiple Use MARC System

Under development is the Multiple Use MARC System (MUMS), a software system that will provide the supporting services required in common by the entire array of bibliographic processing applications.

Instead of each application providing its own message display and storage and retrieval functions, MUMS maintains and controls a central pool of such services for use by all applications. Thus, a particular application provides the program modules needed to execute those tasks central to its purpose, and MUMS provides the servicing modules. If any module is needed by a given application and is not already contained within MUMS, the module is developed according to the specifications provided by the application.

Once included within MUMS, a servicing module becomes available for use in any other application. In fact, the application modules themselves can be shared in this same manner, i.e., a routine originally developed as part of one application program may prove useful to an application under development. In this case, the new application may make use of the module through MUMS.

In addition, MUMS connects the servicing and application modules appropriate to a given application, defines their sequence of operation, and regulates their execution. MUMS is also responsible for determining, on a priority basis, the order in which the applications are to be processed in a multiprogramming environment. Initial applications of MUMS include on-line correction procedures in creating MARC records and on-line input and access to the Process Information File.

Order Division Project

Phase I of the Order Division Project, consisting of programs to handle regular orders and new continuation orders, is in progress. Phase I has been divided into three tasks. Task 1 which covers the production of bibliographic records such as the order file slip, purchase order, or dealer slip, has been operational since February 1971. Work is proceeding on Tasks 2 and 3, which deal with file management and control and the accounting subsystem, respectively. The machine-readable records produced in the Order Division will serve as input to the computer-based Process Information File when this file is automated.

Process Information File

Preliminary investigation is under way to provide on-line input and access to the Library's Process Information File (PIF). The manual PIF has been a valuable tool for locating titles in the process of being cataloged. Its use, however, has been hampered because the only access to the file is by main entry and because numerous misfiled and unweeded cards exist which tend to inflate its size. It is estimated that the PIF contains approximately 576,000 cards, 219,000 of which represent redundant entries. The machine file would eliminate the problem of maintenance, and the flexibility of the format for the machine-readable PIF records would allow access to the file by a number of entry points. The machine-readable PIF record would also be the foundation for the full MARC record and provide accurate and up-to-date status information, an improved selective dissemination of information service to LC staff members, and a prototype for a machine bibliographic file subject to heavy use for a variety of purposes. The automated PIF will be one of the applications of the Multiple Use MARC System.

Authority Files

A processing system is being developed that will provide the capability for the Library to maintain the subject heading file in machine-readable form and to prepare the file for printing according to the specifications of the Government Printing Office for the Linotron. The first phase of the system consists of merging the machine-readable file for the seventh edition of the LC subject heading list with the tapes for the supplements, including all additions, corrections, and deletions, in order to produce the eighth edition of the list and to have one master machine-readable file in a MARC format. Long-range plans for the use of this file include extracting the proper references for each subject heading recorded in a MARC bibliographic record for a computer-produced book catalog and linking the records in this file to the MARC bibliographic records with which they are associated to aid in the subject cataloging process.

Since the early days of the MARC Pilot Project, the Library has recognized the importance of name reference information in machine-readable form to augment the MARC bibliographic records. In addition to fulfilling the requirement for references for card and book catalogs, such data would aid in the searching of computer-based files.

Preliminary investigation for this project included the selection of a sample of name authorities from the LC Official Catalog to determine the characteristics of that file. This information is essential in the development of an efficient file organization technique.

It was recognized that the name reference file either alone or in conjunction with the automated Process Information File and the MARC bibliographic file would provide a valuable aid to cataloging. Although the project is still in the early planning stages, the Library has already held a meeting of a group of MARC users at which the problems associated with a distribution service for reference information were explored.

Book Catalogs

Work is proceeding on several projects to produce book catalogs from machine-readable records. Book catalogs for the reference collections of the Main Reading Room and the Science Reading Room will be produced by the

computer printer. The first book catalog to be printed on the GPO Linotron from MARC data will be Library of Congress Catalog: Motion Pictures and Filmstrips. Work on this pre-photocomposition program is being done with contractual support.

Filing

An internal document specifying a simplified filing arrangement for the Library of Congress catalogs has provided the foundation for a machine filing system. Programs are being written to implement these filing rules for computer-produced book catalogs and to provide the capability to: ignore certain characters (i.e., initial articles such as "A," "An," or "The") at the beginning of certain title fields when filing; place fields beginning with numerals before those beginning with alphabetic characters, with the digits in numerical sequence rather than in the machine collating sequence; and analyze the tags, indicators, or subfield codes for a particular field to achieve the proper filing order (e.g., Washington, George should file before Washington, D.C.). This machine filing program, called LIBSKED (Library Sort Key Edit) has incorporated the routines found in an earlier sort program, SKED (Sort Key Edit).

Conclusion

The MARC, RECON, and format recognition projects have a scope beyond that of automating technical processing functions at the Library of Congress. Although the techniques developed and the data base converted are used internally at the Library, the main thrusts of these projects are the distribution of bibliographic data and the promotion of standards for the library community, both nationally and internationally. Sights have turned inward to the Library on the remainder of the projects; however, byproducts of some of these projects, such as those dealing with name and subject authority files, have implications for the entire library community.

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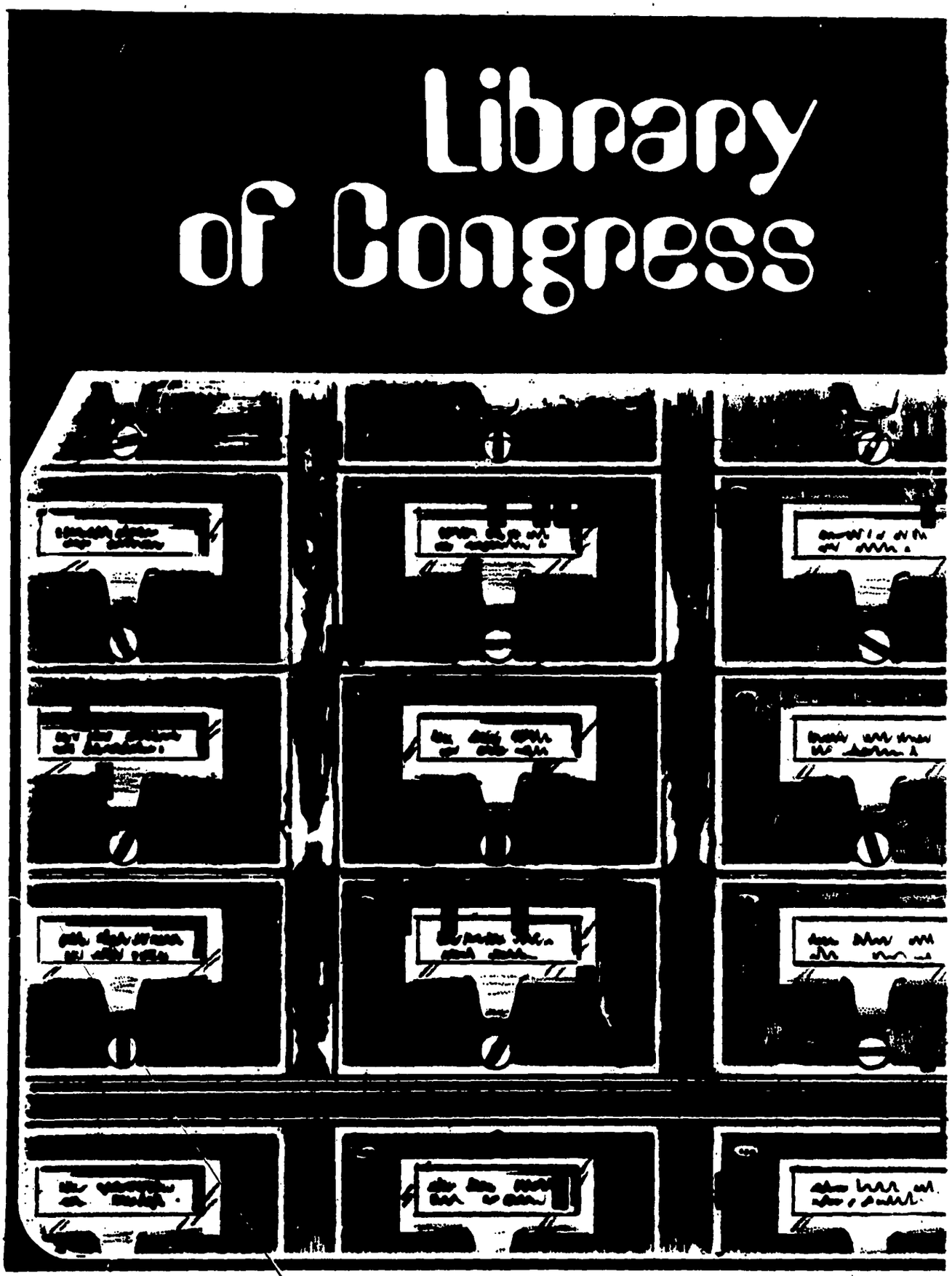
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